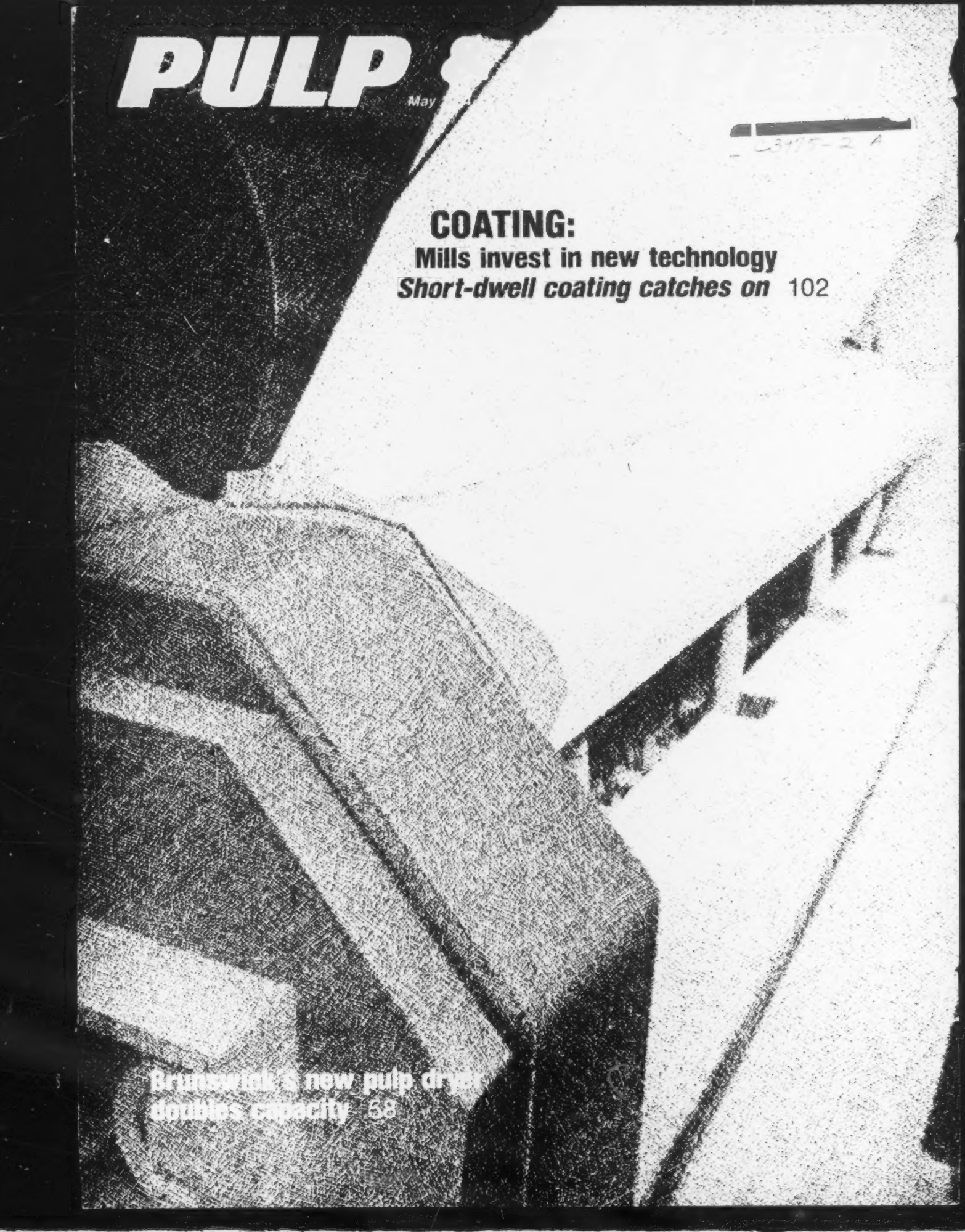
PULP

May



COATING:

Mills invest in new technology

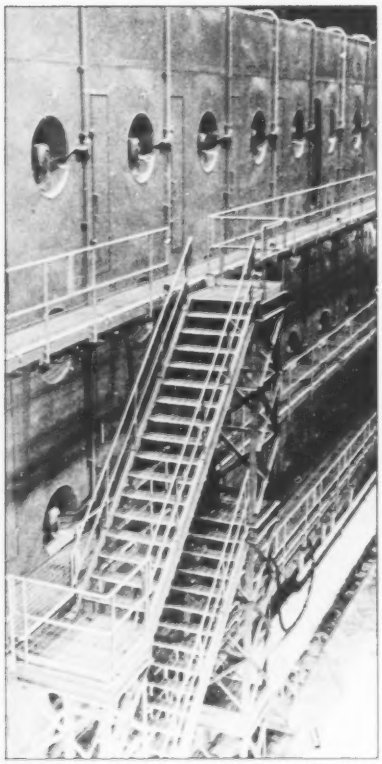
Short-dwell coating catches on 102

Brunswick's new pulp dryer doubles capacity 58

PULP&PAPER

Volume 58 Number 5 May 1984

"SHORT-DWELL" COATING **102**



BRUNSWICK'S NEW PULP DRYER **58**

COVER: *This issue's focus on coating includes an examination of the new "short-dwell" blade coaters. (Photo of Short Dwell blade coater courtesy of Beloit.)*

ISSUE FOCUS: Coating

56 **Coating, filler pigments:** exclusive *P & P* survey shows availability tightening for some pigments, prices steady with few discounts

62 **New grade between SC groundwood, LWC** can be produced by installing coater in dryer section of newsprint, groundwood paper machine; fills curent gap in printing paper market

78 **Mead increases coated paper output** by 615 tpd at Escanaba; expansion project includes new paper machine, off-machine coater

102 **New 'short-dwell' coating heads** reduce sheet breaks, cut coating losses, operate cleaner for less downtime and higher efficiency

138 **Thames Board triples coated paperboard output** with new, five-ply machine, inline coater at Workington, England, mill

Mill Operations

58 **Brunswick Pulp & Paper upgrades market pulp drying** capacity at its Brunswick, Ga., mill with a new 1,000-tpd energy-efficient pulp machine

84 **Press roll cover requirements** have become progressively stringent with increasing nip loads, machine speeds, roll sizes

115 **Chemimechanical market pulps** are replacing some bleached kraft in many paper grades; process has several economic advantages

122 **Automated stencil cutter** uses data from mill management information system; eliminates production delays in finishing/shipping department

Engineering/Maintenance

82 **Elastomer couplings reduce pump failure** at Federal Paper Board; protect bearings from vibration, misalignment, overload damage

132 **Electronic variable speed drives** provide efficient, reliable service, exact control of tension, torque, and equipment positioning

Process Automation

95 **Recovery boiler automation works** at 13 Finnish mills; improves overall efficiency, ups boiler potential to or above rated capacity

99 **Automated roll-tracking system** at MacMillan Bloedel's Powell River Div. has reduced inventory write-offs by more than 80%

Management

118 **A strengthening paper industry** showed near-capacity production levels into 1984, with the most growth in printing/writing, containerboard, and recycled board, API Paper Week attendees learned

135 **Paper imports to Japan have increased** in recent years despite weakening domestic demand; industry seeks to overcome threat

EUROCAN HITS 3-MILLION MARK **35**

FERY COMMENTS ON MANAGING **220**

News

9 **Month in Statistics**—U.S. paper and paperboard production

11 **Marketing Roundup**—Wide-ranging price hikes set on SBS; newsprint makers announce increases; liner price rise seen likely this fall

13 **Grade Profile**—Coated groundwood papers: mills will run full-out this year

23 **News Roundup**—**Mergers:** Bowater spins off North American mills

25 Leveraged buyout planned for Southwest Forest

27 **Labor:** B.C. industry returns to work

29 **Finance:** Manville Forest reorganization approved

33 **Expansions:** James River eyes new tissue machine

37 **Capital Spending:** U.S. producers reveal ambitious plans

39 **International News:** MoDo plans new machine, studies CTMP; French C-D rescue plan taking form; new fine paper unit planned in Brazil

41 **Regulatory Roundup:** Defer acid rain laws, API says; Japan opens MITI groups to outsiders; lawsuit filed in waste site dispute

Columns

7 **Editors' Notebook**—Coating: new technology; good conferences exist

43 **Washington Viewpoint**—Washington from Williamsburg

151 **Career Development**—Do you really want that promotion?

159 **Engineer to Engineer**—Engineers—who, what are they?

205 **Chemical Markets**—Alum markets remain steady as prices rise

220 **Industry Comment**—Managing in an age of uncertainty

Departments

45 **Conference Calendar**

153 **News of People**

167 **Product Showcase**

169 **New Products**

183 **Product Review**

185 **Current Literature**

201 **Book Shelf**

203 **Finishing/Converting**

206 **Supplier News**

Services

163 **Readers Service Index**

179 **Readers Service Card**

208 **Professional Service Directory**

210 **Jobs Wanted**

211 **Classified Advertising**

218 **Advertisers Index**

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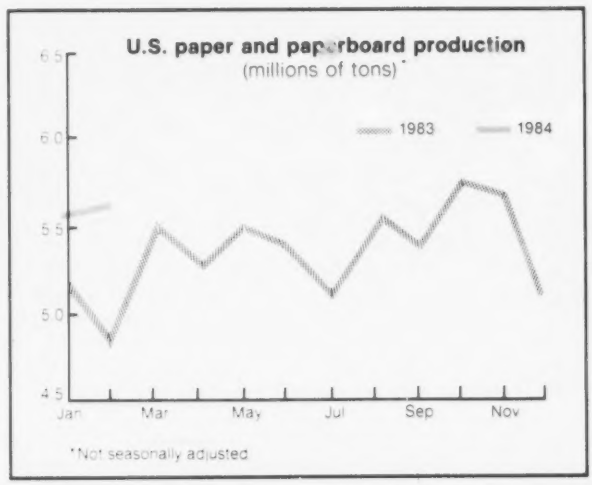
U.S. paper and paperboard production continued very strong in February, totaling 5.6 million tons, up almost 15% from year-earlier levels, according to the American Paper Institute. The January-February two-month moving average of seasonally adjusted data stood at 67.6 million tons, a record for the period. Production was up 8.9% from last year's pace and up 7% compared to the old record set in January-February 1980.

Among major grades, printing and writing papers continued strong, with uncoated shipments up 17% from last year and coated shipments up 23.2%. Newsprint producers operated at record levels, with production up 8.4% from last February. The paperboard side of the industry also continued to show strength, with increases over last year in virtually every grade. Corrugated box shipments, at 21.98 billion ft², set a record for the month, up 18% from last year, said the Fibre Box Assn.

Canadian newsprint shipments totaled 6.5 million tons in February, up 6.3% from 1983, according to the Canadian Pulp & Paper Assn. Woodpulp exports, hurt by the industry-wide shutdown in British Columbia, were down an annualized 13.1%, with operating rates plummeting to 62%.



		Latest month (000 short tons)	% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION[1]					
Newsprint	February	452	8.4	5,470	5.9
Uncoated groundwood (s)	February	128	17.4	1,594	18.0
Coated paper (s)	February	509	23.2	6,137	17.7
Uncoated free sheet (s)	February	736	17.2	9,005	10.2
Unbleached kraft packaging and industrial (s)	February	322	4.9	3,833	0.2
Tissue	February	385	−1.3	4,745	3.0
Total paper	**February**	**2,813**	**18.0**	**34,125**	**9.1**
Kraft linerboard, unbleached	February	1,308	18.5	15,439	11.4
Semichemical medium	February	411	18.8	5,053	15.5
Bleached paperboard	February	340	11.1	3,968	5.0
Recycled paperboard	February	650	17.3	7,927	16.7
Total paperboard	**February**	**2,799**	**17.4**	**33,475**	**12.5**
Total paper and paperboard[5]	**February**	**5,611**	**14.9**	**67,600**	**10.8**
PULP, WASTEPAPER & FIBER[2]					
Total woodpulp production	January	4,371	2.9	52,457	4.6
Market pulp production	January	531	19.3	6,372	16.0
Wastepaper consumption at paper/board mills	January	1,292	9.8	15,504	8.4
Pulpwood consumption (cords)	January	7,185	n.a.	96,220	2.7
CONVERTED PRODUCTS STATISTICS[3]					
Corrugated box shipments (billion ft²)	February	21.983	18.0	44.053[6]	14.1
Containerboard inventories at box plants	Feb. 1	2,404	−3.3		
INTERNATIONAL TRADE[2]					
U.S. paper imports (including products)	January	886	29.5	1,063	29.5
Imports of Canadian newsprint	January	650	20.4	7,802[6]	20.3
U.S. paper exports (including products)	January	341	−2.3	4,097	−2.2
Exports of unbleached kraft linerboard	February	152	−1.9	1,836	−9.5
Exports of woodpulp	January	260	11.1	3,115	11.0
CANADIAN STATISTICS[4] (reported in metric tons)					
Total newsprint shipments	February	646	6.3	1,345[6]	11.0
Operating rates	February	79%	84%	86%	82%
Inventories held by U.S. consumers	Feb. 29	1,249	−2.7		
Woodpulp shipments (export only)	February	473	−3.5	1,045[6]	13.1
Operating rates	February	62%	89%	77%	82%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fiber Box Assn., Paperboard Packaging Council. 4. Canadian Pulp & Paper Assn. 5. Includes construction and wet machine grades. 6. Not annualized. 7. Not directly comparable to year ago because of coding change. (s) = shipments.

Coated groundwood papers:
Mills will run full-out this year

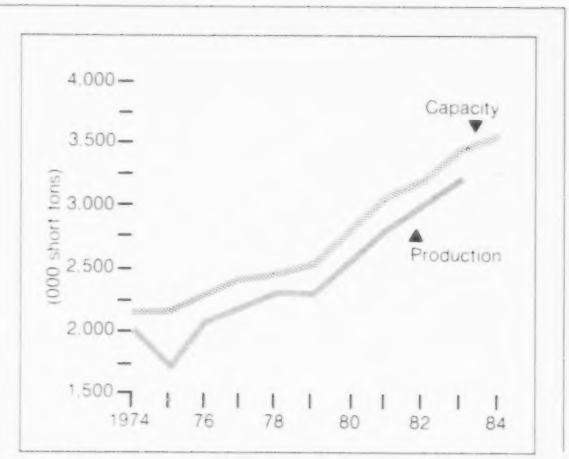
Statistics:	1982	1983	1984e
Production, 000 tons[1]	2,902	3,193	3,454
Capacity, 000 tons[2]	3,242	3,452	3,598
Utilization rates, %	89.5	92.5	96.0
Imports, 000 tons	70	150	150
Exports, 000 tons	35	33	35
Apparent U.S. consumption			
000 tons	2,937	3,310	3,569
lb/capita	25.41	28.36	30.31
000 tons/$ billion real GNP (1972)	1.98	2.15	2.23

e = estimated. 1. *Pulp & Paper* estimates. 2. API capacity for coated groundwood papers—includes coated grades No. 3 and some of No. 4.

GRADE STRUCTURE: Coated groundwood publication papers are made from furnish that includes at least 10% mechanical pulp, with the balance consisting of chemical pulp and fillers. All No. 5 coated paper and about 50% of all No. 4 coated fall into the groundwood category. No. 4 is distinguished by superior brightness and other appearance characteristics, while No. 5 is valued for runability and lighter basis weight. Coated groundwood basis weights are usually from 30 lb to 70 lb (25 × 38 in—500) although the most common range is 32 lb to 50 lb or 60 lb. End uses include magazines, catalogs, directories and other books, plus flyers, Sunday supplements and newspaper inserts. Coated groundwood may be printed by offset, letterpress or rotogravure methods. In the case of lightweight coated (LWC) paper, coat weight can constitute up to 30% of total sheet weight.

PRODUCTION/CAPACITY: Production shot up by 10% in 1983, surprising the industry and its customers alike after the 1982 performance when output rose just 3%. During the latter part of 1983, coated groundwood papers were put on allocation as the market fully absorbed new machines accounting for 543,000 tpy in capacity added in 1982 alone. No new machines are currently scheduled although several possible installations are under study, and capacity growth in 1984 and 1985 is expected to result solely from modernizations and from the continued progress of recently started machines up the learning curve.

OUTLOOK: Coated groundwood paper is in very tight supply and expected to remain so until 1987, barring a recession. The only apparent danger to this scenario would be if price increases in the next couple of years are so dramatic that the catalog, preprint and Sunday supplement markets—the major growth areas for coated groundwood in recent years—are partially driven back to uncoated paper. Assuming current conditions continue, operating rates this year are expected to average about 96%, with shipments rising by 8%.



Estimated capacities of major U.S. companies are:

	Annual capacity (000 tons)	Capacity share (%)
1. St. Regis	625	17.4
2. International Paper	450	12.5
3. Consolidated Papers	380	10.6
4. Boise Cascade	306	8.5
5. Mead	300	8.3
6. Crown Zellerbach	285	7.9
7. Blandin Paper	257	7.1
8. Midtec Paper	200	5.6
9. Pentair Industries	180	5.0
10. Weyerhaeuser	175	4.9
11. Great Northern Nekoosa	165	4.6
12. Fraser Paper	160	4.4
13. Bowater (Bowater Carolina)	124	3.4

U.S. capacity (1984): 3.598 million tons
Capacity share of top five companies: 57.3%
Capacity share of top ten companies: 87.8%

PRICES: Prices went the gamut from discounting in early 1983 to consecutive quarterly increases Oct. 1, 1983, and Jan. 1, 1984. Another increase this year is seen as a good possibility. Typical pricing trends ($/short ton for 34-lb roto paper) are: 1973, $285; 1974, $400; 1975, $385; 1976, $460; 1977, $500; 1978, $570; 1979, $637; 1980, $673; 1981, $735; 1982, $760; 1983, $730; 1984, $830. Offset prices average about $10/ton higher.

MARKETS: About 61% of No. 5 goes into magazines and another 18% into commercial printing, with catalogs and directories consuming a further 15%. Other end uses include books.

(News section continues on page 23)

LABOR

B.C. industry returns to work

British Columbia's two pulp and paper unions voted in mid-April to return to work after the provincial Labor Relations Board ruled that their 10-day-old strike was illegal. While no timetable was given, local unions were to make arrangements with the 20 affected mills for an orderly return to operations, according to Art Gruntman, Canadian Paperworkers Union regional vice president.

The CPU and the Pulp & Paper Workers of Canada struck on Mar. 30 as the industry, on orders from the provincial government, was preparing to end the lockout that had idled 20 mills since the beginning of February (*P&P*, Apr., p. 31). A subsequent government order that the unions return to work was ignored, with CPU and PPWC members voting 63% in favor of continuing the strike, reports indicate. The unions viewed the government intervention as interference with their collective bargaining rights, observers said.

The unions were not alone in opposing the government order to return to work. Employers were also reportedly against lifting the lockout, preferring that the bargaining "be left to run its course," said one observer. The industry, however, did not formally object to the government's intervention in the dispute.

The government has named Clark Gilmore, director of mediation services, to assist in the bargaining. Negotiations between the two pulp unions and the industry resumed on Apr. 4 but broke down less than a week later, reports indicate. In recent negotiations, both sides have refused to budge on the issue of the length of the contract. The CPU and the PPWC indicated they would settle for the three-year agreement the industry is seeking, but they want cost-of-living increase allowances included in the last two years—a stipulation the industry refuses to agree to.

Abitibi is first on CPU's agenda

Labor talks in eastern Canada began Apr. 2 when Abitibi-Price held a meeting with the Canadian Paperworkers Union. Most contracts were to expire in eastern Canada Apr. 30, and the CPU represents most of the workers involved.

CPU president James Buchanan said the union has not yet determined which company it will target. In the past, a settlement reached at a major company such as Abitibi, CIP or Consolidated-Bathurst, or the Eastern Canadian Newsprint Group, was used by the union as a model in negotiating other agreements in the region. The ECNG consists of Domtar, James Maclaren, Reed and Quebec North Shore.

Abitibi and the CPU were expected to exchange agendas, but bargaining was not expected to intensify until later in April, said Buchanan, who went on vacation Apr. 7-14.

The union was set to meet with CIP the week of Apr. 26, and dates were being set to convene with the ECNG later in April and with Consolidated-Bathurst early in May.

The CPU is not concentrating on wage increases this year as it did when contracts expired two years ago. Instead it is seeking a one-year agreement with job security, a shorter work week and improvements in benefits (*P&P*, Mar., p. 25).

Lockout tightens pulp markets

A number of factors have conspired to tighten pulp markets considerably in recent months, ranging from the labor dispute in British Columbia to better worldwide economic conditions to production cutbacks caused by record cold weather in the U.S. South.

These tighter markets encouraged a number of southern U.S. and eastern Canadian producers in early March to announce $50/metric-ton price increases for Apr. 1 in the domestic market, which followed a $40/ton price hike in the first quarter. The new prices are reported to be firm, which means that customers are being socked with a more-than-$90/ton price jump from discounted levels prevailing in the fourth quarter.

The latest increase brings the price of northern bleached softwood kraft tp $540/ton—within shouting distance of the $565 U.S. market peak that became partly established in the final quarter of 1981. Mills in British Columbia will probably not post price increases while labor negotiations are still underway, but they are expected to support market levels once the labor dispute in the province has ended and a contract has been signed.

The British Columbia shutdown resulted in the loss of about 9,500 metric tpd of potential chemical paper-grade market pulp production—or more than 665,000 tons during the ten weeks the pulp mills were idle. Even into the seventh week of the lockout, however, most pulp traders saw little sign of panic in the market, observers reported. Anticipating the shutdown and stronger world pulp demand, U.S. market pulp customers by the end of January had built up inventories of purchased chemical paper-grade pulp to a record level of 514,000 tons, according to the American Paper Institute.

North American and Scandinavian producer inventories of chemical paper-grade pulp tumbled 234,000 tons to 1.07 million tons at the end of February. The average operating rate for Norscan countries dropped to 77.9% in January from 92.2% in December, pulled down by a 52% rate in January for Canadian producers. All others ran above 91%.

Norscan producer pulp stocks plunged 416,000 metric tons in December due to customer inventory building and severe cold weather, which affected maintenance shutdowns of both integrated and market pulp mills, especially in the South.

North American/Scandinavian chemical paper-grade market pulp producer inventories
(000 metric tons)

Month	Total	Tonnage change from previous month	% change from previous month
February	1,059	−234	−17.8%
January	1,289	+86	6.8
December	1,207	−406	−26.0
November	1,630	+127	8.4
October	1,503	+37	1.9

Strike notice given in U.S. talks

Union workers in the U.S. Pacific Northwest may walk off the job, shutting down ten pulp and paper mills owned by three companies, following stike notice given Mar. 30 by the Assn. of Western Pulp & Paper Workers.

It was not clear whether talks were that close to breaking down, however. The two sides were described by observers as fairly far apart, but on Apr. 4 management gave a new proposal to the union, and Apr. 5 the AWPPW asked for a postponement in a meeting scheduled that day to allow more time to study the management offer—which could indicate the union felt the new offer was a sign of progress.

If there is a strike, many of the mills are expected to be run by supervisors, as occurred in the second half of 1978 when most of the U.S. West Coast industry was idled by a strike lasting roughly six months.

Areas of disagreement in current negotiations involve company "take-aways" in both health care and holidays. AWPPW president Farris Bryson said in late March before the strike authorization vote was taken. He said the proposal from the companies would raise health care deductibles and permit mills to run through such previously "restricted" holidays as Christmas and the Fourth of July.

• **Interstate Paper Corp.**, Riceboro, Ga., paid $192,000 in back wages to 211 hourly employees under a rollback/payback agreement worked out last year with the United Paperworkers International Union (*P&P*, June, p. 35).

The employees were repaid for a 7% wage reduction they voted to accept for a six-month period in 1983 to help Interstate during a difficult economic period. Interstate agreed to repay employees when financial conditions improved.

The agreement is believed to be the first of its kind in the pulp and paper industry. It covered the Jan. 31 to July 31 period, after which pay scales returned to previous levels.

U.S. Pacific Northwest mills involved in AWPPW negotiations

Mill	Product, capacity
Boise Cascade	
St. Helens, Ore.	725 tpd uncoated free sheet
	100 tpd tissue
Vancouver, Wash.	285 tpd uncoated free sheet and carbonless
Wallula, Wash.	330 tpd market pulp
	275 tpd medium
	400 tpd uncoated free sheet
Georgia-Pacific	
Toledo, Ore.	1,130 tpd liner and medium
	390 tpd kraft paper
Bellingham, Wash.	500 tpd pulp (some for market)
	45 tpd paperboard
	200 tpd tissue
Weyerhaeuser	
North Bend, Ore.	420 tpd medium
Springfield, Ore.	1,400 tpd liner
Cosmopolis, Wash.	450 tpd dissolving market pulp
Everett, Wash.	385 tpd market pulp
Longview, Wash.	150 tpd market pulp
	565 tpd bleached board
	280 tpd medium

FINANCE

Manville Forest to be reorganized

Manville Corp. said a federal bankruptcy judge gave final approval late in March to the reorganization of its Manville Forest Products Corp. subsidiary. The court's confirmation of the unit's plan allowed Manville Forest to emerge from Chapter 11 proceedings on Apr. 5.

The forest products unit filed a separate reorganization plan from Manville Corp. because its business operations and creditors are distinct from those of Manville Corp. The parent company filed for protection under Chapter 11 of the federal Bankruptcy Code to shield itself from potential future liabilities for asbestos-related health claims.

Unlike the reorganization plan of its parent, which has faced opposition, the reorganization plan for Manville Forest was not challenged. Manville Forest had sales of $426.9 million and income from operations of $53.2 million in 1983.

A company spokesman said that claims by general trade and utility creditors of Manville Forest Products Co. totaled about $15 to $16 million. As soon as possible, the company plans to begin paying off claims up to $10,000, plus interest, and hopes to have all claims paid by Jan. 31, 1985.

The emergence of Manville Forest from Chapter 11 is apparently unrelated to a plan that has been under study to reactivate three idle machines at the West Monroe, La., mill. The company has been talking to a number of containerboard producers and sales agents regarding a long-term contract to market output from the machines. A disagreement between Manville Forest and the local union over staffing levels for the machines has been resolved, the company said, and No. 1 machine will resume production on June 1.

The three machines, which were shut down in 1982, have a combined capacity of around 720 tpd. No. 1 machine had capacity to produce about 300 tpd of corrugating medium, while Nos. 2 and 4 produced about 420 tpd of clay-coated carrier board.

Lawrence files Chapter 11

Lawrence Paperboard Corp. and its subsidiaries, Harriman Paperboard Corp. and Lawrence Packaging Corp. on Mar. 15 filed Chapter 11 in U.S. Bankruptcy Court for the district of Massachusetts. Under Chapter 11, companies are protected from creditor action while given a chance to reorganize their affairs.

Lawrence Paperboard operates a 200-tpd clay-coated folding and setup boxboard mill at Lawrence, Mass., while Lawrence Packaging operates a folding carton plant at that site and Harriman runs a 250-tpd medium mill at Harriman, Tenn.

The two mills and converting plant, which employ 150 in Harriman and 350 in Lawrence, are continuing to run, and the filing is not expected to affect employment levels.

"The reorganization filing was necessitated by continued low prices due to excess industry capacity," according to Steven Marullo, an attorney with the Boston law firm of Marullo & Barnes. This caused cash flow problems, although the companies have recently begun to return to prof-

CAPITAL SPENDING

U.S. producers reveal ambitious plans

Rising operating rates and improving profitability are causing U.S. paper companies to step up their capital spending plans for 1984—and further strengthening is likely as the year progresses.

Paper companies now plan to boost outlays for new plant and equipment to a record $7.13 billion, up 15.4% from $6.18 billion in 1983 and higher than the previous peak of $6.80 billion set in 1980, according to the latest Commerce Dept. survey, conducted in January and February. The previous survey in November and December showed the industry was planning an 11.7% increase in 1984 spending.

The same pattern is being followed by all U.S. business, which is responding to the strong recovery by increasing capital spending. U.S. business now plans to increase spending 13.6% in 1984, up from a 9.9% increase reported in the last survey. Adjusted for a 1.4% estimated increase in the cost of capital goods this year, real spending is expected to rise more than 12.0%, according to the Commerce Dept.

Most major U.S. paper companies plan to either increase capital spending or hold it at relatively high levels, according to recent annual reports. International Paper Co., for example, plans to increase spending 6% to $785 million as it completes its Georgetown, S.C., mill modernization and begins restructuring its Mobile, Ala., facility. Union Camp, on the other hand, will reduce spending 21% to $325 million in 1984 with completion of its new Eastover, S.C., white paper mill in the fall.

More forest products-oriented companies such as Boise Cascade and Weyerhaeuser have begun to revive their capital spending programs. But one exception to the rule is Potlatch, which will hold its spending reins relatively tight at $55 million and concentrate on short-range, high-return capital projects. "Lack of fiscal discipline at the federal level and the difficulties it will create for the recovery" are cited for the company's conservative stance by chairman and CEO Richard B. Madden.

Capital spending plans of major North American paper companies
(millions of $)

			% change
U.S. companies	**1983**	**1982**	**1983-82**
Boise Cascade	$300	$160	87.5%
Crown Zellerbach	300	252	19.1
Fort Howard	130	92	40.8
Hammermill	175	55	218.2
International Paper	785	738	6.3
Kimberly-Clark	350	363	3.6
Potlatch	55	54	1.5
St. Regis	200	102	96.6
Union Camp	325	411	−20.9
Weyerhaeuser	450	312	44.2
Canadian companies			
Abitibi-Price	C$140	C$165	−15.3
Domtar	150	108	39.3

Source: Recent company statements and annual reports.

EQUIPMENT

Valmet and Dominion plan joint venture

Valmet Corp. of Finland and Dominion Engineering Works of Canada last month announced the formation of a joint-venture company, Valmet-Dominion Inc., to manufacture and market paper machines in North America. Valmet will own 65% of the new firm, while Dominion's parent, Canadian General Electric, will retain a 35% stake. Other terms of the agreement were not disclosed. Valmet-Dominion will be located at the present Dominion facility in Lachine, Que.

The agreement has advantages for both parties. The Finnish firm gets its first manufacturing base in North America, as well as a Canadian marketing base. Dominion, which has seen its share of the paper machine market decline in recent years, should benefit from access to Valmet technology and a stronger presence in the U.S. market.

Even without a manufacturing base here, Valmet has done quite well in the North American paper machinery market. The company has sold 15 new machines in North America since 1970, accounting for 11% of new machine sales, according to a recent *P&P Project Report* survey. Six of those installations have included Valmet's Sym-Former twin-wire unit. New Valmet machines have gone mostly into newsprint and fine paper operations.

Over the same period, Dominion sold seven new machines. Dominion has concentrated on the Canadian newsprint makers, selling four of its new machines there—all twin-wire Papriformers.

Machinery shipments seen declining

Paper industry machinery manufacturers had a rough year in 1983, with shipments in constant-dollar terms down for the fourth straight year to their lowest level since 1972. And despite record production levels and high operating rates in many segments of the paper industry, machinery makers will have to wait until 1985 to benefit from the current economic upswing, according to the Dept. of Commerce's recently released *U.S. Industrial Outlook 1984*.

Due to long lead times and the reluctance of papermakers to commit themselves to capital improvements until a recovery is fully underway, recovery in the paper machinery sector traditionally lags a general upturn by a year or more, the Commerce report points out. Making matters worse for machinery suppliers, papermakers seem to be favoring less-costly rebuilds and incremental expansions over new installations more than in the past. Traditionally accounting for about 60% of capital spending, rebuilds may now account for as much as 70% of orders, the report says.

In constant 1972 dollars, U.S. manufacturers shipped approximately $397 million worth of paper machinery in 1983, down 4.0% from 1982. The Commerce Dept. expects shipments to decline again in 1984, dropping 1.8% to $387 million—a 22% decline from the 1979 high of $495 million. The drop-off will mask a pickup in shipments late in the year, however, as deliveries are made on orders received in 1983 and early 1984. New orders in early 1984 are expected to jump 10% from 1983 levels.

Coating, filler pigments: prices are steady but availability is tightening

Pulp & Paper's annual survey reports most prices stable in 1983, but shipments were up for anhydrous kaolin, TiO_2 and other pigments

By SUSAN S. TAYLOR, Staff Editor

■ The demand for coated paper in 1983 reached record levels as shipments rose 13.7% over 1982 to 5.72 million short tons vs 5.03 million short tons in 1982. Uncoated free-sheet grades have also rebounded from the depressed levels of the past two years. Shipments were up 10.6% to 8.68 million short tons. However, early 1984 reports show these grades losing ground. Shipments of coated boxboard and other grades consuming coating and filler pigments are generally up. The largest gains in production for the year were in printing/writing grades, up 11% from 1982 in response to improvements in business activity in general.

Kaolin production levels generally paced the rising production of these paper grades, up nearly 7% to an estimated 6.8 million short tons vs 6.36 short tons in 1982. However, kaolin consumption by the paper industry remained fairly static in 1983 compared with 1982 levels, at approximately 3.15 million short tons.

Demand for all pigments is forecast to be up in 1984. The paper industry has been on an upswing since spring 1983 and is expected to continue to improve through 1984. Continued growth of the industry could result in a 100,000- to 200,000-ton boost in consumption this year. Improvements in the housing and steel industry also increased demand for pigments in paint and coverings and for refractory clays. The U.S. Commerce Dept. reported housing starts at a seasonally adjusted rate of 1.67 million units in December 1983, a significant improvement over the 1.0-million-unit level of 1982.

KAOLIN CLAY. Kaolin clay on a tonnage basis is by far the major pigment used by the paper industry in coating and filler applications. Although industry demand was about the same as in 1982, some producers indicated that 1983 shipments were significantly higher. Contrary to last year, the improved economic situation and increased demand for pigments in other uses resulted in transaction prices very near list prices, although there is still some discounting for hydrous grades.

Kaolin prices in 1984 will probably be increased only moderately (5% to 6%), if at all. Some producers are predicting no price increases at all, with changes mostly reflecting the elimination of substantial discounting done in the past. One producer reported no discounting from list. Most producers are holding prices even though their costs have increased somewhat. However, the expected increase in volume should keep the kaolin industry's rate of return at more acceptable levels.

Since kaolin clays are produced in a variety of grades and a broad range of prices, it is difficult to analyze general trends in pricing and availability. For simplification, the clay market can be divided into three basic categories: premium clays (including anhydrous or calcined, high-brightness No. 1, and delaminated grades), commodity coating clays (Nos. 1, 2, and 3 clays), and filler grades (both water-washed and air-floated).

Anhydrous kaolin prices reportedly rose 9.6% to as much as $415/ton, following a modest 5.8% increase in 1983. This product's growing popularity as a replacement for titanium dioxide is reflected in this year's tight market situation compared with last year. According to one producer, "last year everyone was trying to generate business, but this year everyone is sold out." J.M. Huber Corp. started up a new calcined clay facility (its first venture into this market) in late 1983. The firm expects to be producing paper grades later this year. This, and plans by other producers to expand capacity, should ease the market situation for this grade somewhat.

On the other hand, the reported 12% to 13% overcapacity in the industry for most hydrous clays should keep them readily available through 1984. Prices for high brightness No. 1 grades increased about 5% although, as mentioned, not all producers raised list prices and actual transaction prices vary. Delaminated grades are in somewhat short supply according to some producers, but others report that the product is readily available, and prices in 1983 generally remained on par with 1982.

Commodity clays are reported to be readily available by most producers, although at least one supplier reports some tightness of supply. Prices are up in the range of approximately 6% to 8%. Producers of filler clays (both water-washed and air-floated) are reporting good

supplies to meet the expected increase in demand, and prices remain very near the 1982 price levels.

TITANIUM DIOXIDE. Overall demand for titanium dioxide (TiO_2) was up 12% to 15% in 1983. Both rutile and anatase grades are in tight supply, reflecting the much improved protective coatings markets such as paint for houses and automobiles. The paper industry's market share of these pigments shifted downward slightly as the other industries improved. Paint accounts for more than 50% of dry anatase use. A tight balance of supply vs demand is predicted through the summer of this year, and there is already some controlled distribution for anatase. If the economy remains at current levels or improves by 5%, demand for anatase is predicted to exceed supply due to the loss of 100,000 tons of capacity (shutdowns of NL Chemicals and Gulf + Western Industries) in 1983. In fact, some spotty shortages of this product have already been reported. Imports are reported to be 20% lower than at this time last year, which will also tighten U.S. supply.

Considerable discounting is still occurring, although list prices have changed very little. However, most producers expect that discounting will taper off toward list prices, with transaction prices being at list by year-end. Most producers feel that transaction prices must improve from the current depressed levels to achieve a reasonable rate of return.

Inventory levels are very low, and the industry is currently operating at near 100% capacity.

CALCIUM CARBONATE. Calcium carbonate ($CaCO_3$) demand in 1983 was about the same as in 1982, according to most producers. Both ground grades and precipitated $CaCO_3$ are reported to be readily available. However, demand is projected by producers to rise quickly in this year due to increased demand for the product in alkaline papermaking. Several large paper machines reportedly running alkaline systems have recently come onstream. A significant increase in $CaCO_3$ demand for paint grades is also anticipated, reflecting continued improvements in the housing and automobile industries.

Paper industry demand for ultrafine ground calcium carbonate was reported to be up 50% in 1983, and an equal increase is expected in 1984. More than one producer plans to continue increasing capacity, although the industry still has some excess capacity.

PLASTIC, OTHER PIGMENTS. Plastic pigments used by the paper industry are reported to be in good supply, and prices are at the same level as the previous two years, remaining at $0.75/lb. PPG Industries Inc. has discontinued production of its Hi-Sil 404 extender pigment. Otherwise, silicas-silicates remain at about the same price level. However, supply is reported to be tightening.

The talc market has improved somewhat, and prices are up about 12%. A similar growth is predicted for 1984. Zinc oxide pigments (used in reproductive paper applications) are in adequate supply, with only a modest (5% to 8%) price increase predicted for the coming year. The use of photoconductive-grade zinc oxide pigments remains stable after decreasing over the past several years. Prices of hydrated alumina are up somewhat, with demand at about the same level as in 1982. Only insignificant (5%) price increases are expected.

Urea-formaldehyde and satin white pigments have been dropped from this year's survey. The major producer of urea-formaldehyde is currently reviewing its position in this market. The only major manufacturer of satin white reports that since sales of this product are miniscule and limited to one customer it should not be reported as a major industry pigment. ■

TABLE 1. **Prices and availability of commonly used pigments for coating and filler applications.**

	Availability[1]		Price quotations ($)[2]		Year-to-year increase (%)
	1983	1984	March '83	March '84	
Calcium carbonate					
Ground natural, medium ton dry	Market	Market	98-125	98-125[3]	0
Precipitated, bag, ton[4]	Market to tight	Market	155-218	160-218	1.3
Hydrated alumina, slurry, ton	Market	Market	365	439-460	23.2
Kaolin, clay, ton[5]					
Anhydrous kaolin	Market	Very tight	365	385-415	9.6
High brightness, No. 1	Market	Market	144-154	143-169	4.7
Delaminated, standard grades	Market	Tight	96-134	96-128	−2.7
No. 1 coating	Market	Market	88-107	88-118	5.6
No. 2 coating	Market	Market to tight	70-84	68-98	7.8
No. 3 coating	Market	Market	68-81	68-81	0
Filler,					
Water-washed	Market	Market to tight	51-66	49-63	−4.5
Air-floated	Market	Market to tight	31-40	31-46	8.5
Plastic pigments, lb	Market	Market	0.75	0.75	0
Silica-silicates, ton	Market	Tight	520-535[6]	485-560	0
Talc, bag, ton	Market	Market	169-189	170-230	11.7
Titanium dioxide					
Anatase, lb, dry	Market	Tight to very tight	0.69-0.73	0.69-0.70	−2.2
Anatase, lb, slurry	Market	Tight	0.69-0.70	0.69-0.70	0
Rutile, lb, dry	Market	Market to tight	0.75-0.77	0.75-0.77[7]	0
Zinc oxide, lb	Market	Market	0.5025	0.58-0.665	23.9

1. Availability terms are defined as follows: Very tight—on allocation or demand significantly higher than supply; Tight—demand slightly greater than supply; Market—supply and demand in balance or excess capacity available.
2. Prices are based on quotations for bulk f.o.b. plant shipments, except where noted, but do not necessarily represent the range in prices listed by all producers.
3. Higher quality ultrafine and fine-ground carbonate grades are available at $15-$25/ton more than the highest price.
4. Bulk shipments are $32-$45/ton lower.
5. Slurry shipments of kaolin clays are $6/ton lower on a dry basis. Shipment in 50-lb bags usually commands a premium of $22 over bulk prices.
6. 1982 prices.
7. Rutile slurry is generally available at $0.02-$0.05/lb less than quoted price.

PROCESS AUTOMATION

BENEFITS OF RECOVERY BOILER COMPUTER CONTROL SEEN AT 13 MILLS IN FINLAND

Computer control systems optimize sootblowing, saltcake reduction, fluegas O_2, and allow operation at or above rated capacities

By PERTTI VALKAMO and OSSI PANTSAR

■ A study was conducted in Finland from 1970 to 1973 by the Finnish Recovery Boiler Committee (composed of pulping industry representatives, boiler manufacturers, and Ekono) to find basic material for a recovery boiler computer control system.[1] The first control project as a result of this study was started in 1974 by Enso-Gutzeit Oy, Nokia Electronics, and the University of Oulu. The system that grew out of this project was put into operation in the beginning of 1976.[2-4] Today a total of 13 such systems are in operation in Finland.

Table 1 shows the boiler makes and types of control systems at these 13 mills. The increased capacities at Äänekoski, Kemi, and Pori were attained after modifications to the boilers themselves and/or to auxiliary equipment such as fans. Because several systems were installed on existing and often very old boilers, certain limitations were encountered, for example, in selecting air systems, airflow measurements, and controls.

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Kaukopää No. 1 has a condensed system consisting principally of the airflow controls. The system on the Pietarsaari Babcock & Wilcox unit was completed during 1983, and the mill has only limited experience with its operation. Therefore, this system is not discussed in detail along with the 12 other projects.

Because specific benefits depend on a wide range of variables—which include required process changes, experience and expertise of mill staff and vendor personnel, in addition to the control system used—exact monetary savings due to boiler automation are difficult to define. This article, therefore, does not analyze the systems implemented at these mills from this perspective.

Reliable feasibility studies on the advantages of boiler automation are possible but generally require a series of mill trials and careful analysis and planning of any needed process changes. To maximize a mill's investment in boiler automation, it is strongly recommended that process changes, instrumentation, and the computer system be handled as a total package.

PROCESS CHANGES. The first Kaukopää control system was a pioneer project in Finland, and experience gained here was extended to subsequent systems installed at other mills, regardless of the boiler and computer system manufacture. Initially, it was suspected

TABLE 1: **Recovery boiler control systems in Finland in 1983.**

Mill	Company	Boiler	Capacity (tpd dry solids)	Control system	Delivery
Kaukopää	Enso-Gutzeit Oy	C-E/Ahlström (No. 3)	680	Afora[1]	1976
Veitsiluoto	Veitsiluoto Oy	Tampella	1,250	Measurex	1978
Kaukopää	Enso-Gutzeit Oy	C-E/Ahlström (No. 2)	680	Afora	1979
Äänekoski	Metsäliiton Teollisuus Oy	Ahlström	540[2]	Afora	1979
Kemi	Kemi Oy	Gotaverken	1,170[3]	Afora	1980
Kaukas	Oy Kaukas AB	SMV (C-E)	720	Measurex	1980
Kaukas	Oy Kaukas AB	Ahlström	450	Measurex	1980
Kaukopää	Enso-Gutzeit Oy	C-E/Ahlström (No. 1)	436	Afora	1980
Pori	Oy W. Rosenlew AB	B&W	350[4]	Afora	1981
Rauma[5]	Rauma-Repola Oy	Tampella	1,050	Afora	1982
Pietarsaari	Oy Wilh. Schauman AB	Ahlström	1,300	Afora	1982
Tainionkoski	Enso-Gutzeit Oy	C-E/Ahlström	680	Afora	1982
Pietarsaari	Oy Wilh. Schauman AB	B&W/Ahlström	800	Afora	1983

1. Formerly Nokia Electronics. 2. Original capacity 420 metric tpd dry solids. 3. Original capacity 960 metric tpd dry solids. 4. Original capacity 280 metric tpd dry solids. 5. Na-bisulfite process.

TABLE 2: **Sootblowing steam consumption before and after computer control and summary of required shutdowns for boiler cleaning.**

	Sootblowing steam (%)		Cleaning method and shutdown cycle
	Previous	Existing	
Kaukopää, C-E 3[1]	6	4.5	Occasional removal of salt block on the furnace arch
Veitsiluoto[1]	6	5	Water wash during programmed shutdowns
Kaukopää C-E 2[1]	6	5	Horizontal economizer washed after three weeks
Äänekoski	6	5	One extra water wash in addition to holidays
Kemi	8	4.7	Manual cleaning (periodically)
Kaukas, SMV[1]	6.5	5	One water wash saved annually
Kaukas, Ahlström	7.5	5	One water wash saved annually
Pori	7	6	Manual cleaning, interval 3 weeks
Rauma	4.8	3.4	Some manual cleaning, interval 2 months
Pietarsaari, Ahlström	4	3	Water wash, interval 1 to 1.5 years
Tainionkoski	6.5	3.5	Water wash, interval more than a year

1. 10% overload.

that experiences gained with a Combustion Engineering boiler could not be applied to other boiler types. However, the essential characteristics seemed to be common for all types. Typical boiler features needed for implementation of the control method included:

- Stationary firing
- Plate-type nozzles
- Low primary airflow
- High secondary airflow
- Dimensions between primary and secondary air level of 40 in. to 60 in.
- Small number of liquor guns
- Large-size liquor guns.

At mills when these conditions do not exist—e.g., if the level of secondary air is too high—problems and future boiler modifications can be expected.

Stationary firing without oscillating liquor guns guarantees a stable furnace operation and decreases the carry-over of carbon. Also, liquor gun maintenance is relatively low with stationary firing. In some boilers, relocating the liquor guns was necessary.

Some of these process changes have been made without computerization on several recovery boilers. However, the effort to stabilize the furnace conditions has often led, or will eventually lead, to a control system investment in these cases.

Recovery boiler operating conditions at individual mills had significant differences. Some plants were not recovery boiler limited, and the benefit of increased production could not be accurately determined in the feasibility study. However, several recovery boilers are currently operating almost continuously above rated capacity, which was not the case before installation of the control system.

B&W boilers generally have a relatively high percentage of reduction. Therefore, the reduction improvements with these boilers amounted to only zero to one percent in B&W units, as was the case with both boilers at Kaukas. Excess air and fluegas loss could not be decreased in some recovery units.

SOOTBLOWING OPTIMIZATION. One of the most positive benefits has been a reduction in sootblowing steam. The sootblowers worked according to a fixed schedule or even continuously during the noncomputerized operation. Although savings vary considerably, generally the total benefit has been sufficient for a payback time of one to two years on the computer control investment.

The savings in sootblowing steam have been generally supported by a reduced number of shutdowns required for total water washing or manual cleaning of a clogged boiler. Additionally, some mills report the existing deposits to be easier to remove than before.

The basic strategy in sootblowing optimization is to control conditions in the furnace so that salt deposits are minimized and are not sticky. Installation of only the sootblowing control system—leaving the furnace control noncomputerized—has not been considered feasible in Finland.

Sootblowing steam is normally reported as a percentage of the generated steam, without taking into account the different enthalpies of sootblowing and main steam. A comparison of sootblowing steam consumptions before and after computer control can be easily made if all boilers are operated at their rated capacities. However, this comparison is difficult when boilers are operated in an "overload" condition. Table 2 summarizes sootblowing steam consumption and required shutdowns for boiler cleaning at the various mills.

A 2% to 2.5% savings in sootblowing steam was typical during the first years after the system startup on the Kaukopää Nos. 2 and 3 units. However, an effort to operate these boilers at 10% overload increased sootblowing steam consumption.

Clogging has not been a problem with the computerized recovery boilers. However, cleaning of the boilers is performed, at least occasionally, during repairs. The cleaning method depends on the structure of the specific boiler. The newer boilers with membrane walls are mostly water washed through the sootblowers. The older boilers with brickwork cannot be washed often and cleaning is therefore performed manually, either during shutdown or while oil firing.

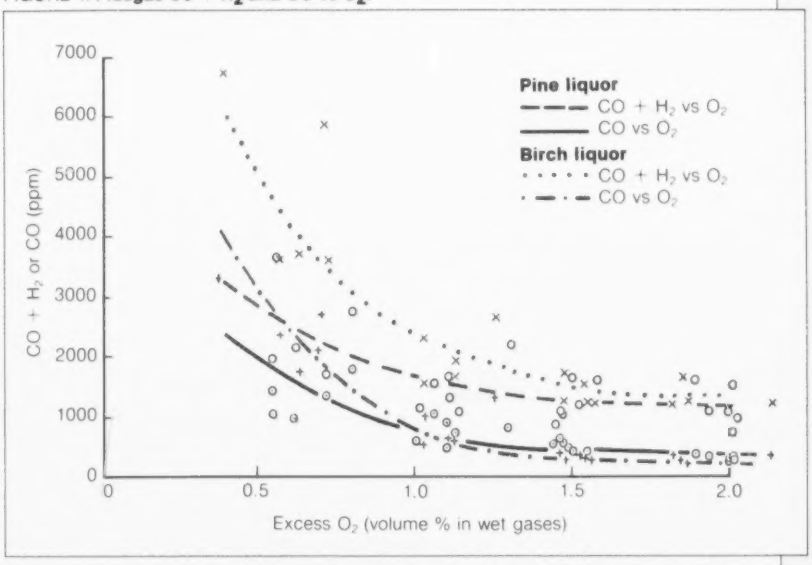
Kaukopää No. 3 collects a salt block on the furnace arch near the one side wall. This is not harmful if the block is removed during shutdowns. Clogging initially occurred at Veitsiluoto, but replacing the secondary air system made extra shutdowns unnecessary.

Kaukopää No. 2 unit is furnished with a horizontal economizer that is impossible to keep open regardless of the sootblowing method. It must, therefore, be washed frequently.

Operation of the Ahlström boiler at Kaukas was improved when capacity of the secondary air system was increased. However, two more sootblowers for the lower boiler bank are needed.

Oy W. Rosenlew AB's mill unit at Pori has problems typical of an older boiler, and therefore the operating periods are very short. The low original rated capacity of

FIGURE 1: **Fluegas Co + H_2 and CO vs O_2.**



this boiler must be considered when discussing its cleaning problems.

The C-E boiler at Tainionkoski was not furnished with new sootblowers in the rear generating tube section during the boiler modification as were the other Enso units. After boiler operation at higher loads using the new air system, it became immediately evident that the replacement of these blowers was absolutely necessary.

The parameters for a sootblowing control system have been discussed by Hoynalanmaa.[4]

Generally, lapsed time controls sootblowing in the superheater (and screen) section. Fluegas pressure drops very seldom reach their critical points in this area. In the boiler bank, fluegas pressure drops usually start sootblowing, but time lapses can do it also, at a low load. The economizer is blown according to the fluegas pressure drop or heat transfer coefficient.

Parameters that start the sootblowing can change, for example, according to the clogging situation in the boiler. Any changes in the setpoints or sootblower pressures have a certain influence upon the parameters. Exact information on the basis of the sootblowing parameters has, therefore, not much significance.

SALTCAKE REDUCTION. The percentage of sodium sulfate reduction has generally been increased in the computerized boilers. These gains, as shown in Table 3, were due to a combination of modifications to the process, basic boiler operations, and computer control.

The degree of modifications varied at the individual mills. If only the computer system was purchased, operating changes were relatively small. If, on the other hand, changes were made in the air and liquor systems, large alterations in air distribution were possible.

Computer control keeps conditions in the char bed stable, preventing the typical variation between shifts with manual operation. In two boilers, the air and black liquor systems were changed before computer control was implemented. These changes made the boiler operation worse and caused lower reduction percentages. In these cases, the existing computerized operation has been compared (in Table 2) with the original situation before the above alterations.

The comparisons for Veitsiluoto were difficult because the system was installed in a new boiler. The period without the computer control was short and consisted of the mill startup phase with numerous fluctuations.

If overflow from the fluegas or main dissolving tank scrubbers is led into the dissolving tank, apparent reduction of green liquor is decreased, and possible reduction improvements are difficult to justify.

DECREASE IN EXCESS AIR. Boiler trials are used to determine the optimum oxygen level in fluegas so that gas losses are minimized. The control system maintains this level and does not allow variations between the shifts. Decreases in fluegas O_2 are shown in Table 4.

TABLE 3: **Percentage increase of sodium sulfate reduction.**

Kaukopää, C-E 3	4
Veitsiluoto	1
Kaukopää, C-E 2	4
Äänekoski	5
Kemi	1
Kaukas, SMV	—
Kaukas, Ahlström	—
Pori	1
Rauma	2
Pietarsaari, Ahlström	1.5
Tainionkoski	3.5

TABLE 4: **Percentage decrease in fluegas O_2.**

Kaukopää, C-E 3	0.5
Veitsiluoto	1
Kaukopää, C-E 2	0.5
Äänekoski	0.5
Kemi	0.5 to 1
Kaukas, SMV	1
Kaukas, Ahlström	1
Pori	1
Rauma	0.6
Pietarsaari, Ahlström	0.5
Tainionkoski	1

The boiler operation at Äänekoski was not normal before the basic changes in boiler operation. An addition of excess air was necessary to get the boiler to work in the best possible way.

The lowest O_2 reading reached, 1.5%, was reported from Rauma.

It is absolutely necessary to find the optimum situation in the trials before adjusting the computer to keep the variables at this point. If the optimum cannot be found, even manual control is better than computerized control because it does not keep the variables so rigidly at the poor setpoints.

Using the measurement of fluegas O_2 or CO for controlling excess air was analyzed in a recent article by D.F. Dyer and G. Mapels.[5] One of the Finnish boilers was thoroughly studied as a basis for a master of science thesis.[6] The author, as well as his instructors[7], came to the conclusion that CO cannot be used as a single loop variable in a recovery boiler if optimum efficiency is desired. However, it can be used to give useful information, especially during the disturbances.

Measurements have been completed with both birch and pine liquor at different black liquor flows and temperatures. In the optimum area for the Äänekoski boiler, the curve CO vs O_2 in Figure 1 is nearly horizontal and therefore inappropriate for airflow control. The hydrogen in the fluegas seems to have a substantial role in fuel losses and cannot be ignored

TABLE 5: **Basic instrumentation on the computerized recovery boilers.**

	Black liquor				Fluegas				
	Dry solids	Flow	Visc.	Furnace temp.	O_2	Dust	SO_2	CO	H_2O
Kaukopää, C-E 3	1	1		4	1	1	1		
Veitsiluoto	1	5	1	8	1	1	2		2
Kaukopää, C-E 2	1	1			1				
Äänekoski	1	1		4	2	1			
Kemi	1	1		4	2	1			
Kaukas, SMV	1	1		4	1	1	1	1	
Kaukas, Ahlström	1	1		4	1	1	1	1	
Pori	1	1		4	1	1			
Rauma	1	1		4	3	1	1		
Pietarsaari, Ahlström	2	5		4	2		1		
Tainionkoski	1	1		4	1	1			
Pietarsaari, B & W	1	3		4	2				

TABLE 6: **Typical instruments for recovery boiler control.**

Black liquor dry solids	EMC refractometer
Black liquor flow	Fischer & Porter magnetic meter
Furnace temperature	Gulton pyrometer
Fluegas dust	Sick opacity instrument

OTHER BENEFITS. Other benefits of recovery boiler automation have been widely discussed in several references.[2,6,8] However, many advantages cannot be meaningfully measured in monetary terms.

One benefit of significant value, but one which cannot be readily measured, is the potential increase in boiler capacity. Possibly some of the boilers at the 13 Finnish mills can be overloaded as much as 10% on an annual basis with the help of the computer system, process changes, and better know-how. However, because the need for extra boiler capacity varies from mill to mill, no data can be shown for this. However, it can be verified that production at the mills discussed is not limited at all by the recovery boilers.

The emission of H_2S at the mills with computer controlled recovery boilers is zero for all practical purposes. Also, SO_2 emissions are extremely low. This means some savings in makeup chemicals, depending on the initial situation and makeup added by the mill.

INSTRUMENTATION DETAILS. The extent of specialized instrumentation on boilers at the 13 Finnish mills varies widely. Instrumentation for measuring combustibles is provided for all of the boilers, and the Kaukas unit is equipped for CO_2 measurement. Table 5 shows the basic instrumentation in use on the various boilers.

Some interesting special problems have occurred with these instruments. Some refractometers have been disturbed by the carbohydrates present in birch liquor, causing an error in the reading. Soap in black liquor also causes an error in one refractometer's operation. Sometimes it has been possible to correct this error in the program.

Magnetic flowmeters are in generalvery reliable. However, they can be disturbed by gas bubbles generated in the indirect black liquor heaters, cascade evaporator, or liquor tanks.

Calibration problems were experienced with the pyrometers. The failure of these instruments was very common initially, before it was learned to install them behind a glass plate.

The gas sampling system of the analyzers may cause some trouble. The Zr_2 type of oxygen analyzers have no sampling system and are very suitable for the recovery boilers, although their ceramic filters seem to be slightly troublesome. At Rauma, a gamma ray instrument for dry solids content was found to be most suitable for that mill's liquor.

Earlier some mills had reported needing approximately one person for instrumentation maintenance for each recovery boiler. However, this estimate now seems to be slightly conservative for some of the mills.

Table 6 shows typical instruments and their suppliers for recovery boilers in Finland.

FUTURE BOILER CHANGES. One advantage of the computer control system has been the precise information it provides when changes to a boiler are necessary. Computer reports and other data can be used to determine the absolutely necessary modifications for increasing the capacity of a recovery unit. This helped Veitsiluoto modify its boiler, and was very useful at Kaukas for making several changes in the extension of its secondary air system.

At this time, no solution has been found to the Kaukopää No. 3 furnace arch salt collection problem, although the symmetry of secondary air is being studied very carefully. ■

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Top API officers welcome EPA administrator William D. Ruckelshaus *(third from left)* on his return to the paper industry to deliver a luncheon address at the API annual meeting. From left are Louis F. Laun, president, API; Dr. Edwin A. Gee, API chairman and International Paper Co. chairman and CEO; and Albert F. Duval, API vice chairman and Hammermill Paper Co. chairman and CEO.

High production levels continue into 1984, API Paper Week told

Most strength shown by printing and writing papers, containerboard and recycled board, with many grades pushing close to capacity levels

■ Production in the paper industry remained near capacity levels in February after running at a seasonally adjusted rate of better than 68.5 million tpy the preceding two months—equal to a 96% of total capacity, American Paper Institute president Louis F. Laun said at the start of Paper Week, Mar. 12-15, in New York City.

Nearly all major sectors of the primary industry strengthened, but the most remarkable advance was in printing/writing papers, containerboard, and recycled paperboard, Laun noted.

"If, as expected by most economic forecasters, business activity continues its upward trend throughout 1984, the demand for pulp, paper and paperboard is expected to continue strong," noted Laun. "Current rates of production, if sustained throughout the year, are high enough to yield a 6% increase in production, while the increase in capacity could permit some further expansion, particularly in white paper grades."

The marked improvement in the paper industry in recent months is expected to put upward pressure on capital expenditures also, Laun noted. Dept. of Commerce estimates paper and allied products industry capital expenditures of $6.9 billion on new plant and equipment in 1984, compared with less than $6 billion spent in 1982 and $6.7 billion in 1981.

WHITE PAPERS. Shipments of uncoated free-sheet paper by U.S. mills should rise by 4% to 5% this year from last year's already-healthy levels, API vice president James Hutchison told Paper Week delegates at the Waldorf-Astoria Hotel. The performance by coated paper mills could be more exciting, although an exact forecast may be more difficult to make. Hutchison noted that "when the actual shipment and production data are analyzed for the last five months of 1983, it appears that coated groundwood capacity for 1983 was slightly over 3.7 million tons, rather than the 3.452 million tons reported in the (API capacity) survey."

With coated groundwood mills making more paper than capacity surveys had indicated was possible, plus the "relatively soft demand in the first quarter of 1983," Hutchison said, "the amount of coated paper available for sale by U.S. mills in 1984 will be 8% over the amount shipped in 1983. Even if shipments only maintain the pace of the last five months of 1983, 1984 will be 6% over last year."

Capacity won't be rising as fast in the next two years as in the last five, however. No new coated machines have been announced, which means that "large blocks of new domestic capacity cannot reach the market before 1986." By contrast, coated groundwood capacity rose by 41% between 1978 and 1983—or 52%, if the higher-than-expected 1983 performance represents a more accurate capacity number—and coated free sheet was up 15% (see Table 1).

During that same period, several factors acted to push up coated paper demand—at a time when the U.S. GNP only rose by 7% for the whole five years. Among them are an increase in catalog paper demand by 11%/year, last year's "substantial improvement in magazine advertising lineage," the "penetration of coated papers in commercial printing," and the "desire of paper consumers to increase their inventories over the levels maintained in 1982."

Hutchison believes stocks have continued to rise among commercial printers and, to a lesser extent, among magazine publishers, "although the amounts to

date have been geared more to keeping pace with sales rather than an overbuilding of stocks."

On the uncoated side, he noted that six machines will start up in the U.S. between now and 1987, a 15% rise in capacity. "As a result, the buyer should be willing to place orders closer to his needs rather than build inventory as he did a decade ago."

While that scenario is different from the recoveries of the 1970s, there are some similarities between 1983 and 1972, he said. "During 1983, uncoated free-sheet shipments plus net imports exceeded the trend relative to U.S. gross national product by 6%," he pointed out. "The amount above the trend line was quite similar to its performance in 1972," he added. Some of this jump came from inventory building, API believes, although mill inventories dropped by 50,000 tons last year.

Uncoated free-sheet mills have benefited from relatively slow capacity growth over the last five years, with total capacity going up just 17%. During that time, bond papers turned into a 1.98-million-ton market and forms bond into a 1.715-million-ton sector. "The growth in these grades came from increasing demand for office copying, word processing correspondence and computer output," he noted.

Another major uncoated free-sheet grade, offset papers, suffered from competition with coated in recent years "but experienced a substantial flow of demand in the fourth quarter of 1983, due in part to the tight coated paper supply/demand relationship," Hutchison noted.

MARKET PULP. The U.S. paper industry continues to rely on domestic and imported supplies of market pulp for about 12% of its total paper-grade pulp needs, despite recent industry acquisitions and integrated expansions, stated API vice president Ronald J. Slinn.

Although some analysts expect major structural changes on the demand side of the U.S. pulp market, these still have not appeared in API's statistics, Dr. Slinn said. Of the 4.8 million metric tons of chemical paper-grade market pulp delivered to U.S. consumers in 1983, U.S. producers shipped almost 48%, down from about 49.5% in 1982 but significantly higher than their share in each of the previous three years.

Pulp shipments to the U.S. market in 1983 were up 20% over 1982 and set a new all-time record, reflecting strong paper production, particularly for printing/writing paper grades. The proportion of market pulp to total U.S. white pulp consumption tends to rise significantly as the activity rate of the U.S. printing/writing paper sector moves into the lower 90% range, Dr. Slinn noted. White paper activity rates rose to just under 94% in the fourth quarter of 1983 and have picked up still further in the first two months of 1984.

"However, U.S. pulp consumers did not actually consume all of that increased volume of market pulp shipped to them last year," Dr. Slinn said. Consumers built up their purchased paper-grade pulp inventories by 85,000 metric tons during 1983 and added another 38,000 tons in January 1984. This brought inventories at the end of January to 514,000 tons—the highest level in recent memory, significantly above the previous high of 469,000 metric tons in December 1974 and 82% above the most recent low of 281,000 tons in February 1974.

Dr. Slinn said strengthening world pulp demand and the possibility of labor problems in British Columbia were behind the buildup in U.S. consumer pulp inventories. "The apprehensions were indeed warranted with the shutdown on Feb. 2 of some 51% of total Canadian chemical paper-grade market pulp capacity," he said. The dispute has resulted in the loss of about 9,500 tpd of potential market pulp production—more than 370,000 tons cumulatively not available for the world market.

Meanwhile, North American and Scandinavian producer inventories of chemical paper-grade market pulp plunged 416,000 metric tons in December due to customer inventory building and severe cold weather, which affected maintenance shutdowns of both integrated and market pulp mills, especially in the South.

A modest rebound in January inventories has been followed by another substantial drop of 234,000 tons in February to 1.07 million tons at the end of the month. The last two lows reached in Norscan producer inventories were in July 1974 (514,000 tons) and in December 1979 (614,000 tons), Dr. Slinn noted.

"Should the labor dispute in British Columbia fail to find an early solution, we could soon see the testing of a new lower physical limit to producer inventories," Dr. Slinn said. Simple extrapolation from the two previous lows would suggest 714,000 metric tons based on growth in the world pulp market and level of market pulp inventories which producers now need to keep larger pipelines filled.

TABLE 1: **U.S. coated paper expansion vs growth in real GNP, 1978-83 (000 tons).**

	1978	1983	% change 1978-83
Coated groundwood	2,450	3,452	41%
Coated free sheet	2,096	2,402	15
Total	**4,546**	**5,854**	**29**
U.S. real GNP (billions of 1972 $)	1,439	1,535	7

Source: API.

P&G leads in API annual safety awards

API presented its Annual Safety Awards to three companies in recognition of their outstanding safety performances. The awards were won by Procter & Gamble Paper Products (which won three awards), International Paper, and Boise Cascade.

Winners are those companies that have had the lowest accident and injury safety records over the past five years and experienced no fatalities or permanent disabilities. Incidence rate takes into account the total number of occupational injuries and illnesses relative to total workhours.

P & G achieved a five-year cumulative rate of 2.71 for the period Jan. 1, 1979 to Dec. 31, 1983 among mills operating 2.5 million or more workhours annually. IP registered a cumulative total incidence rate of 3.34 at its Texarkana, Texas, mill during the five-year period for mills operating 1.5 to 2.5 million workhours annually.

P & G's East River River mill in Green Bay, Wis., for the second consecutive year, won the award for its mill which registered a cumulative five-year total rate of 4.55 for mills with 1.0 to 1.5 million workhours annually. P & G's Cheboygan, Mich., mill won with a 2.54 rate in the 500,000 to 1.0 million workhours annually category. Boise Cascade's Latex mill at Beaver Falls, N.Y., was the winner for the second year in a row in the fewer than 500,000 workhours category with an incidence rate of 3.85.

If the "curiously consistent interval" of about two years and nine months between peaks and valleys occurs, this new trough in Norscan producer inventories would occur in May of 1985, Dr. Slinn said. If there is indeed another 15-month wait before the next trough, the curve for inventories this cycle would not be V-shaped but "more like the flat floor of a wide valley."

Dr. Slinn suggested that pulp consumers might soon begin to expect shipment delays. Helping to ease the supply situation, however, will be the 1.2 million metric tons of chemical paper-grade market pulp capacity scheduled to be added to world supplies between 1983 and 1986, of which more than half will be built in the U.S. This will increase the U.S. share to 20% of the projected world capacity in 1986 of 28.5 million metric tons, up from 18% in 1983.

Federal reports on Japanese industry

The objectives of a U.S. delegation that traveled to Japan to discuss the two countries' paper industries were met for the most part, said John R. Kennedy, president of Federal Paper Board Co., at API's Paper Week, Mar. 12-15.

Kennedy and ten other paper industry executives, as well as representatives from API and the U.S. government, attended meetings in Toyko with 19 Japanese paper industry executives, representatives from the Japan Paper Assn., and the Japanese government Feb. 14-16. The sessions, arranged at the invitation of the Japanese industry, dealt with topics of concern to both countries.

The agenda—agreed upon prior to the start of the meetings—included the following subjects: the pulp and paper industry and its future developments; availability of resources; structure of the industry; the industry's approach to trade; and its approach to government relations. The only part of the meetings not arranged in advance was the questions, said Kennedy.

"The discussions were frank but friendly, and, as can be expected, the only truly controversial points arose in a discussion of the U.S. and Japanese papers on trade," he noted.

Key objectives of the U.S. delegation were determined in advance and approved by the executive committee of API, said Kennedy. Generally, the objectives were met, although the Japanese continued to defend their policies on trade.

While the U.S. executives sought to convince the Japanese that their tariff and nontariff barriers make it too difficult for the U.S. to compete in Japan, the Japanese maintain that their tariffs are not overly restrictive and that U.S. companies must learn the requirements of the Japanese market and how to operate within their distribution system, said Kennedy.

The U.S. delegation sought to convince the Japanese that the U.S. industry is not attempting to dominate the Japanese market but is seeking a "reasonable increase in our share of their market," said Kennedy. Asked what U.S. executives considered a "reasonable share," U.S. delegates indicated that it would be determined by "market forces" if trade barriers were eliminated.

U.S. executives were concerned about the Japanese Depressed Industry Law, feeling that some inefficient facilities might be protected. The legislation funds capital improvement in the Japanese industry. The Japanese argued that imports increased in recent years—a time when their industry was operating below capacity. Kennedy felt the Japanese arguments were weaker than the U.S.'s position where the two sides disagreed. "Logic and reason is on our side," he said. He noted that one member of the Japanese delegation in a "rather outspoken and unplanned comment" implied that the Japanese industry needs barriers to survive.

"I think this is clearly the key issue," said Kennedy. "The Japanese feel that the cost advantage U.S. producers enjoy is so basic they cannot compete and therefore will lose their markets unless they are in some way protected." Kennedy noted that 40% of Japan's pulp production is based on imported pulpwood.

Both sides agreed, however, that the meetings were a success, said Kennedy. "It was an initial and vital step in the process of opening a large and important market to the U.S. industry. It will not come easy; it will take hard work and time, but the rewards can be great," he noted.

SOUTH AMERICAN CHALLENGE. South America is already competitive with the U.S. in hardwood fiber and is growing huge amounts of conifer, according to Bruce Zobel, professor emeritus at North Carolina State University's School of Forest Resources. But because of lower quality, serious competition from South American softwood fiber may be 20 to 25 years away, until trees are further genetically improved.

Zobel said the main potential for timber production in South America is not in the jungles or Andean region, but in large plantations established on savannahs and grasslands. Planting and harvesting on such grasslands, stretching for millions of acres, can be done at low cost. Zobel showed slides of uniform trees in a Brazilian eucalyptus plantation which had reached a height of about 100 ft in seven years and were ready for harvesting.

BLEACHED PAPERBOARD. Overcapacity could easily drag down the solid bleached sulfate paperboard market after 1985 if the industry adds any more machines other than one planned by Westvaco Corp. forest products analyst Thomas Clephane of Morgan Stanley warned paper executives during a session at API's Paper Week.

If capacity is increased by only the 175,000 tons Westvaco is slated to bring online in 1986, bleached board industry operating rates should reach 98.6% in 1985 and 97.4% in 1987. This year, mills should run at 97.3%, up from 95.6% last year and 88.9% in 1982, according to Clephane's estimates. He noted that a major factor in the industry's high operating rates last year was a 3.9% decline in capacity during 1979-83.

SBS markets should be tight during the next two years, said Clephane, with capacity expected to increase just less than 3%. Demand, however, should not improve very much for most end uses. The biggest potential for growth will be in aseptic packaging and ovenable paperboard, he noted (see Table 2).

Aseptic packaging is still in its infancy in the U.S., and producers of bleached board for aseptic packaging should note that Swedish producers have the best technology in that market. Billerud is also planning a 200,000-ton expansion by 1986, and part of that tonnage will be directed to the U.S. market, said Clephane.

Aseptic packaging and ovenable paperboard consumption is expected to rise by 26% to 100,000 tons by 1987, compared to 40,000 tons last year, Morgan Stanley figures show. But just 15,000 to 30,000 tons of that growth will be in ovenable board.

Clephane's projections for the next three years also indicate some growth in export markets (3.5%) and an "other" uses category which includes record jackets and blister packaging (4.5%). Demand for milk carton, folding carton, and cup and plate stock will remain relatively flat during the next three years.

Flat for the past four years, prospects for the folding carton market itself don't appear promising. In addition, SBS producers may continue to lose market share to clay-coated and uncoated kraft paperboard, said Clephane. He said about half of Procter & Gamble Paper Products Co.'s Pampers disposable diapers and all of Kimberly-Clark Corp.'s Huggies line are being boxed in clay-coated board.

Domestic milk carton consumption was up 1.9% last year, but this does not reverse the decline of the past several years, said Clephane. The industry has tried to increase milk carton usage through a campaign alerting consumers to the nutritional advantages of paperboard containers. It succeeded in increasing milk carton sales in cities tested last year, the Paperboard Packaging Council said.

Except for aseptic packaging—and, to some extent, ovenable board—the bleached board industry is mature and is expected to grow at a rate lower than the GNP, said Clephane. Production is expected to reach 4.23 million tons by 1987, up less than 8% from 1983's total of 3.92 million tons.

WASTEPAPER DEMAND. Long-term demand for secondary fiber will surpass forecasts for the year 2000 if consumption continues to grow at its present pace, stated J. Rodney Edwards, API vice president-paperboard.

In the first eight weeks of 1984, wastepaper utilization at domestic recycling mills was up 10% from the same period last year, he noted. At that rate, wastepaper collections could total over 20 million tons by year-end, a new record. Last year, a record 18.6 million tons of paper stock was collected for recycling. Domestic consumption reached 16 million tons and exports totaled 2.6 million tons (see Table 3).

Greater utilization of recycled fiber at U.S. linerboard and corrugating medium mills was responsible for a 700,000-ton increase in consumption of corrugated containers to 8.3 million tons, noted Edwards. Exports totaled 993,000 tons. Domestic utilization of old newspapers was down slightly to 3.4 million tons due to a drop in demand from the nation's deinked newsprint mills. Exports, though, rose by 20,000 tons. Demand for mixed papers and pulp substitutes was up last year. Mixed papers consumption increased by 300,000 tons to 2.5 million tons, and pulp substitutes demand rose by 500,000 tons to 4.2 million tons, Edwards said.

H.C. Bowen Smith, of Salomon Brothers Inc., underscored the concern about possible future shortages of secondary fiber, stressing shrinking sources of primary fibers. Smith cited several factors which could put pressure on fiber supplies before the year 2000 and cautioned mills to be prepared to pay more for their furnishes and to seek alternative sources—especially secondary fiber supplies—in order to reduce future cost increases.

Smith expects that the growth in waferboard and oriented strand board will continue to absorb increasing amounts of the chip supply, especially in the South and Pacific Northwest.

This will cause greater competition for softwood supplies in the South, where most of the land is held by individual timber owners, a good portion of whom have allowed replanting to lag harvesting—only one or two acres in seven are replanted. By the 1990s, noted Smith, the South could have a severe softwood shortage.

Historically, use of wastepaper has trailed the growth of paper and board consumption. During the past 20 years, paper and board demand rose 55%, but only 5% of the additional fiber requirements came from secondary fiber, Smith said. The recovery rate for wastepaper, however, has increased 22% over the past ten years, helped by a 275% increase in wastepaper exports.

Another factor which will affect fiber supplies in the future is increasing demand from Canada, Mexico, and the Pacific Rim countries. Exports of wastepaper have risen rapidly and boosted prices on both coasts of the U.S. This will continue to increase fiber costs for domestic mills in those regions, noted Smith.

Rising fiber costs may affect the future viability of recycled board mills, which are also vulnerable to rising purchased energy costs. Some recycled board mills have recently been installing onsite cogeneration to reduce their energy costs.

More competition for secondary fiber is coming from containerboard mills, which have been using more wastepaper in recent years due to improvements in repulping technologies. In 1983, recycled corrugating medium output increased twice as much as semichemical production from last year. Smith noted that linerboard mills now use up to 20% of hardwoods and wastepaper in their furnishes compared to 5% to 7% a few years ago.

(Continued on page 123)

TABLE 2: **Projected U.S. bleached board growth rates by end use markets (000 tons).**

	1983	1987	Projected average annual growth rate 1983-87
Domestic milk cartons	602	602	0.0%
Folding cartons	1,719	1,825	1.5
Cup and plate	703	703	0.0
Export	516	592	3.5
Other	338	403	4.5
Aseptic and ovenable	40	100	26.0
Total	**3,918**	**4,225**	**1.9**

Source: Morgan Stanley Research estimates.

TABLE 3: **U.S. wastepaper consumption, exports and collections, 1983-82 (000 tons).**

	Consumption at U.S. mills'	Exports	Total collected
1983			
News	2,952	461	3,414
Corrugated	7,349	993	8,343
Mixed	1,823	705	2,527
High-grade deinking and pulp substitutes	3,826	414	4,240
Other	44	—	44
Total	**15,994**	**2,574**	**18,568**
1982			
News	2,974	439	3,413
Corrugated	6,770	887	7,657
Mixed	1,707	497	2,204
High-grade deinking and pulp substitutes	3,437	304	3,742
Other	34	—	34
Total	**14,923**	**2,127**	**17,050**

1. Includes consumption at plants making molded pulp and insulation products. Source: API.

Interfaced with the mill's host computer, each automatic Stencil Punch machine produces one stencil every 20 to 25 sec—two to three times faster than the manual rate.

consists of the roll number, directional arrow for unwinding, lineal footage, weight, production date, customer name, order number, and destination. On product for export, standard data are expanded to list the customer's name, mill order number, a "made in U.S.A." tag, and a "use no hooks" warning. Optional variable information includes metric measurements, consignee, shipping data, and applicable customs information.

MACHINE FITS SMOOTHLY. According to Georgia Kraft, the two automated stencil machines were incorporated with no special modifications in the mill's data systems. Since the devices cut stencils for everything the mill makes, roll size and weight data received by the host computer goes directly to the stencil cutter. This provides more complete, accurate production records for inventory control, shipping, and customer service. The two automatic units now produce stencils at the rate of one every 20 to 25 sec, two to three times faster than the previous manual rate of 1/min.

The original system considerably burdened workers at the end of production lines, according to the mill. It was difficult to keep manual stenciling activities in step with production. Now that employees at roll scale stations no longer manually cut stencils, everything—except applying spray paint to stencils—is done automatically, and worker productivity is noticeably higher.

Due to its success with automatic stenciling at Rome, Georgia Kraft has ordered two more units (with a third in reserve) for scales at the end of two Macon lines. ■

HIGH PRODUCTION LEVELS CONTINUE

(Continued from page 121)

"Unless paper companies devise a strategy to deal with the changes that are affecting their fiber supply, some facilities will be paying substantially more for fiber than their competitors," he noted.

Countries in the European Economic Community will also be competing for secondary fiber supplies in the future, said Albert De Monts of the European Confederation of Pulp, Paper Board Industries (CEPAC), in another speech given during Paper Week.

The use of wastepaper in newsprint mills has reached over 40% and is expected to continue to increase—though slightly—reaching as much as 800,000 metric tons within the next few years, De Monts said. During the past few years, paper stock imports to the European Economic Community have risen between 200,000 and 500,000 tpy, less than 5% of total consumption in that region.

TISSUE. Tissue manufacturers will have to look hard at fiber costs in the coming years if they want to maintain a competitive position, consultant Fred D. Iannazzi said at another session. A major force affecting the tissue industry's cost position in the next five years will be the cost of secondary fiber, which Iannazzi believes "is likely to increase substantially."

In order to restrain secondary fiber cost increases, Iannazzi believes "a collective, industry-wide effort is needed to promote programs for source segregation of office waste and the development of mechanical separation of mixed office waste."

Iannazzi indicated another possible approach would be to use chemimechanical pulp as an alternative to chemical pulp. CMP mills are far less expensive to build than chemical pulping facilities, he noted. And while "some tissue mills are not near a sufficient supply of pulpwood to support onsite pulping, the much smaller economic scale of operation and the higher pulp yield associated with CMP reduce the necessary quantity of wood to only a fraction of that for a chemical pulp mill," Iannazzi added.

Other fiber alternatives should be examined by tissue producers because wastepaper demand will rise rapidly over the 1982-86 period, driving up prices. While domestic wastepaper recycling capacity will rise at a 4.4%/year rate, U.S. exports of wastepaper will shoot up at a 17%/year rate, Iannazzi indicated to the conference attendees.

The increasing dependence of tissue mills on wastepaper supplies was shown by Iannazzi's estimate that recycled fiber represented 28% of tissue fiber furnish in 1975 and 39.4% in 1982—but "should reach 50% within the next five years." Mills are adding deinking capacity at a 4.2%/year rate, while tissue demand went up only 1.7%/year over the last decade.

(Fred D. Iannazzi is president of Andover International Associates, a new firm specializing in management consulting for the forest products industry. Andover International Associates will be presenting one-day executive seminars with *Pulp & Paper* and *Pulp & Paper International* in New York, N.Y., Montreal, Que., and Vancouver, B.C., in May and June 1984 on the North American industry's world competitive position in the 1980s.) ■

Japanese pulp and paper industry struggles against import threat

Faced with an unusual reversal of roles, industry in Japan is considering ways to produce cheaper paper products to combat rising imports

By RICHARD S. THORN

■ In recent years the U.S. pulp and paper industry has made strong inroads into the Japanese market despite a relatively weak growth in Japanese demand for paper products. This has resulted in an unusual reversal of customary roles, with the Japanese industry calling for special help to overcome the threat of imports. Despite sluggish paper production in Japan, the volume of imported paper has been rising, posting an increase of 29% in 1982. This has produced an average annual growth of 16.9% for the past five years.

The ratio of imported paper to total Japanese consumption is currently still small, ranging only between 2% and 4% of total domestic consumption. However, the import of newsprint and kraft linerboard, which represented 70% of 1982 imports in volume, accounted for 8.9% of newsprint and 14.5% of kraft linerboard consumed in Japan.

An overwhelming majority of Japan's imported newsprint is shipped by the North Pacific Paper Corp. (Norpac), a U.S.-based joint venture of Jujo Paper Co. of Japan and Weyerhaeuser Co. of the U.S. It is significant that newsprint produced overseas, although regarded as inferior to the domestic product, has been accepted in the Japanese market. Encouraged by the success of Norpac, other overseas papermakers are now planning to enter the Japanese market.

In Japan, there is some apprehension about the stability of imported newsprint supply, particularly in view of the huge Japanese consumption of several thousand tons daily. Another problem is price instability caused by fluctuations of the exchange rate. A third disadvantage of imported newsprint is the high incidence of tear (about four to five times higher than that of the domestic product). Some overseas producers are moving to secure storage facilities in Japan to ensure a stable supply. However, due largely to the quality problem, they have not been successful in gaining long-term supply contracts. The cost advantage of imported newsprint, nevertheless, is having a significant impact on domestic newsprint manufacturers who have, so far, dominated the market.

Nearly 60% of Japan's imported kraft linerboard in

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TABLE 1: **The 10 leading Japanese paper and paperboard manufacturers in 1982 in terms of production (000 tons).**

Company	Paper, paperboard output	Share (%)	Paper output	Share (%)	Paperboard output	Share (%)
Oji Paper	1,739	10.0	1,707	16.5	32	0.5
Daishowa Paper Manufacturing	1,298	7.4	926	8.9	372	5.2
Jujo Paper	1,177	6.7	1,177	11.4	0	0
Taio Paper Manufacturing	1,084	6.2	854	8.3	230	3.2
Honshu Paper	765	4.4	290	2.8	475	6.7
Sanyo-Kokusaku Pulp	611	3.5	600	5.8	11	0.2
Kanzaki Paper Manufacturing	488	2.8	488	4.7	0	0
Settsu Paper Board Manufacturing	414	2.4	0	0	414	5.8
Mitsubishi Paper Mills	413	2.4	373	3.6	40	0.6
Daishowa Pulp Manufacturing	390	2.2	0	0	390	5.5
Total of 10 companies	**8,379**	**48.0**	**6,415**	**62.0**	**1,964**	**27.7**
Others	9,074	52.0	3,938	38.0	5,136	72.3
Total	**17,453**	**100**	**10,353**	**100**	**7,100**	**100**

Source: Japan Paper Assn.

1982 came from the U.S. Most of it was shipped by Weyerhaeuser, which established a storage center in Japan in 1982, thus cutting sharply the delivery time and assuring a stable supply. This U.S. company succeeded in stablizing the Japanese price by revising its sales contracts with Japanese clients and quoting its prices in yen, thereby assuming the exchange rate risk itself.

Imported kraft linerboard is superior to its Japanese counterpart in strength and is 10% to 20% cheaper because of the higher pulpwood and energy costs in Japan. The import of this product, therefore, poses a great threat to the future profitability of Japanese linerboard production procedures.

THE JAPANESE INDUSTRY. The production of paper and paperboard in Japan grew 10% to 11% annually from 1965 to 1973, a period of spectacular economic growth. Reflecting the slowdown in demand through the protracted recession that followed the first oil shock in 1973, Japanese paper production has dropped to an annual average increase of 1.1% (through 1982).

Paper and paperboard production in 1982 reached 17,450,000 tons (up 2.8% from the preceding year), and shipments were 17,480,000 tons (up 1.8%). Domestic demand was also weak at 16,750,000 tons (up 1.2%). Demand for paperboard, in particular, dropped 0.4% from the preceding year, the third consecutive drop. This is due to the fact that in packaging, corrugated board is being replaced by thinner materials to conserve resources.

Japan currently has some 580 paper and pulp manufacturers, of which 71 are large companies affiliated with the Japanese Paper Assn. The remaining 50% are medium-to-small firms. The diversity of paper products provides ample room for numerous firms to coexist.

The 71 major companies have an 84% share of total production. The production of the leading company accounts for 10% and the top five, for 34.7% of the total. The profit of these companies, except for manufacturers of art paper and other special products, is below the average for manufacturing industries. Reasons for this

Renting space is a major expense of opening a branch office in Japan

■ Trade consultants agree that one of the quickest ways to penetrate the Japanese market is to open a market research-oriented representative office or sales company in Tokyo. Since most major Japanese companies have their headquarters in Tokyo, it is not surprising that most foreign companies have located their representative offices there also. But the price of doing this is not cheap.

Tokyo's average initial cost of a 1,775-ft² office for about 10 people—according to the Japan Building Owners & Managers Assn., which keeps tabs on nearly 400 office buildings in Tokyo—is 22 million yen (US$92,000). This includes a deposit of 21 million yen (US$88,000), a monthly rent of 851,000 yen (US$3,620), and a monthly building maintenance fee amounting to roughly 20% of the rent, or 172,000 yen (US$720).

Although the deposit is returned when the tenant moves out, it still is a large sum to pay out—and no one escapes it. The deposit payment began in the postwar years when office buildings were few in number and when the owners desperately needed funds to rebuild their war-torn buildings. The econornic slowdown of the past years has dampened the rate of increase on deposits more than the growth of rents, but mandatory deposits will undoubtedly persist for some time to come.

Initial expenses on an office vary considerably according to the age of the building and its location in Tokyo. The 18-story Twin Tower building in the high-class Akasaka district charges a total initial payment of 31 million yen (US$130,000), or about 40% more than the average Tokyo cost for the same 1,775-ft² space.

In Tokyo, the average space for an office with 10 people is 1,400 ft², but office consultants believe 1,775 ft² is necessary for comfortable working conditions. This space is the smallest unit for rent in the brand new Akasaka Twin Tower.

Small offices. For an even smaller setup, such as a representative office for about four people, special compact buildings with mini offices of 710 ft² are available at upward from 4,784,000 yen (US$20,000) in residential neighborhoods near business centers. The cost of renting an office can be further economized by converting an apartment into an office. A 635-ft² apartment in the Shinagawa district, about 10 minutes from Tokyo Central Station by city train, requires an initial cost of 615,000 yen (US$2,580), or only 13% of the cost of the 710-ft² mini office that is within walking distance of a central business location.

Apartment building owners usually ask for two months' rent as a gift and one or two months' rent for the security deposit—a rather modest initial investment compared with the deposit required for an office building. Apartments are a practical solution for low cost entry into Japan. Once established in Tokyo, the cost of expanding into other big cities is relatively inexpensive. Compared with the number one location, Tokyo, the initial cost of renting an office in Osaka and Nagoya—Japan's number two and number three cities—is 43% and 53% lower, respectively.

The monthly building maintenance fee that must be paid along with each month's rent amounts to approximately 15% to 20% of the rent. In addition, each tenant needs to bear other costs such as heating, air conditioning, ventilation, and window washing, although these vary according to each building.

Staff costs. The greatest cost of a Japanese office, however, is employees. The average annual pay in Japan is more than 3.3 million yen (US$13,900), which means that the total monthly pay of three workers is as costly as the rent for a plush office in the Akasaka Twin Tower building. Salaries go up annually while office rents generally increase every other year, both keeping pace approximately with the rate of inflation.

The office space vacancy rate is 1.6% nationally and 0.8% for Tokyo. Although most office buildings seem to be occupied, about 16% in Tokyo alone have one or more vacant offices for rent. ■

include a heavy financial burden on the companies due to excessive dependence on borrowings, a rise in pollution-prevention investment, and growing energy costs.

Obviously overloaded with surplus equipment and without the prospect for an improvement of the paper market, the Japanese pulp and paper industry has been designated by law as a structurally depressed industry. It made efforts to survive the recent recession and stabilize its business management under special provisions provided by the law for depressed industries.

Operating rates in 1983 were estimated at 70% to 75% for paper and about 60% for paperboard. It should be noted that the rate for paperboard remains low even though about 20% of the corrugated board material capacity (including kraft)—which accounts for about 60% of paperboard production—was scrapped in 1979. This means that about 30% of all paperboard manufacturing equipment is in excess capacity.

As for the market trend, despite the industry's voluntary efforts to reduce production, principally for three major types of paper (coated paper, high-quality paper, and kraft paper), prices have drifted downward due to sluggish demand. Specifically, the price of paperboard, centering on corrugated board material, has been on the downturn. Recovery of the paperboard market has been difficult because of increasing paper imports and intensified competition among domestic producers.

The Japanese law dealing with structurally declining industries was aimed at averting social hardship due to unemployment and reducing the impact on regional economies, which are seriously affected by these industries. While it is left up to each individual industry to chart its future direction on the basis of market principles, this law assists impacted industries in making a transition to a more viable state.

FUTURE OUTLOOK. While Japanese paper imports are steadily increasing, domestic demand is expected to stagnate in future years. According to the Japanese government's estimate, domestic demand for paper will show an annual average growth of 2% to 3% at best. In this environment, the Japanese paper industry is making several efforts to improve its situation.

First, the industry is moving toward reorganization. In 1983 at least four mergers were completed among larger companies. Some observers maintain that the pulp and paper industry should be streamlined through amalgamation into about 10 groups, with lead companies at the core. These observers further advocate that surplus facilities and equipment should be scrapped and a joint production and sales system be set up. Moves toward reorganization are likely to accelerate.

So far the industry has tried to cut production costs by increasing its use of recycled newsprint. However, the collection of used newsprint is approaching a practical limit, and the industry is forced to find a new solution. In August 1982, 26 Japanese pulp and paper companies organized the Pulp & Paper Research Assn. (PPRA), with the purpose of developing new energy-saving technology for manufacturing paper. In other efforts, paper companies in Japan are studying the feasibility of relieving their interest burden by reducing borrowing, stabilizing the price of raw materials with a project to develop pulp and pulpwood overseas for import to Japan, and improving plant operation rates through selective scrapping of manufacturing equipment. ■

VARIABLE-SPEED DRIVES IMPROVE CONTROL

(Continued from page 134)

Originally, wound rotor motors used in adjustable-speed drives had variable resistors in the rotor circuit. Rotor energy was converted to heat in the resistors and lost in the atmosphere, or cooling equipment was added to remove the heat. The efficiency of the drive was poor, and a method of recovering the energy was needed.

Today, the slip energy from the rotor circuit is rectified to d.c. and converted to a fixed voltage and fixed frequency to be fed to the motor stator. The invertor for the slip recovery unit is line commutated. The a.c. power source supplies energy to turn off thyristors, similar to a d.c. drive operating in the regenerative mode. This eliminates a separate commutating circuit need.

The slip energy recovery drive is of similar or higher efficiency when compared with other electronic drives. The major cost item is the motor, as in the case of a d.c. drive. Full motor power does not go through the controller, unlike other electronic drives. When a limited speed range is required, it allows the controller to be sized significantly less than the rated motor power, and thus allows use of a lower cost controller. The wound rotor slip recovery drive operates below synchronous speed and cannot operate above it.

Cycloconverter drive. A cycloconverter converts a.c. input at line frequency to another frequency through a one-step process. One converter is used for each phase winding of the motor. Power circuit (Figure 7) operates in the phase-control, line-communication mode.

The maximum output frequency applied to the motor is only a fraction of the supply frequency. The cycloconverter may be applied to both synchronous and induction motors. The control system is designed to obtain performance from the rotating field machine equal to that of a d.c. machine under current control. The cycloconverter drive is normally furnished for very large-horsepower, low-speed applications, providing high efficiency and fast response.

EFFICIENCY RATINGS. Electronic adjustable-speed drives are highly efficient over their total operating speed range. This contrasts other methods of modulating process output, such as fan dampers and throttling valves on pumps. Other types of adjustable-speed drives have significant slip loss, which drastically reduces efficiency at points below full speed. Total energy loss and operating power cost depend not only on drive efficiency but on the operating load profile of the application.

Efficiency evaluations are normally made between electronic drives and other methods of control. In some cases, a comparative analysis is needed for the various types of electronic drives described in this article. However, a general comparison is not possible. Efficiencies will vary between specific products in each type of drive. These variations are greater than any general differences between drive types. Motor design and the specific operating points for efficiency calculations are the largest contributors to efficiency differences. Power circuit configuration also has an effect.

Different drive types will have different efficiencies, depending on the specific application. Therefore, efficiency comparisons between electronic adjustable-speed drives should be made for each particular application and for the specific equipment involved. ■

Alum markets remain steady as prices rise

By BARRY SHOCKETT

U.S. alum consumption is still on an even keel, having increased on aggregate only about 2,500 tons from 1979 to 1983. This situation is not expected to change significantly in the immediate future. Price increases will be tied mainly to raw material and transportation costs.

Sparked by strong growth in municipal sewage applications, total alum demand in Canada is expected to grow between 4% to 5% over the next four years.

U.S. statistics, 17% Al_2O_3 (000 short tons)

	1980	1981	1982	1983e
Nameplate capacity[1]	2,300	2,500	2,565	2,600
Production	1,182	1,206.5	1,186.5	1,200
Imports	26.8	27	24.8	33
Exports	11.6	28	6.8	17
Apparent consumption	1,197r	1,205.5r	1,204.5	1,216

1. Based on industry estimates of operating rates. r=revised.
Source: Bureau of Census, U.S. Dept. of Commerce

Canadian statistics, 17% Al_2O_3 (000 short tons)

	1980	1981	1982	1983e
Nameplate capacity	275.5	275.5	286.5	297.5
Production	199r	196.5	192r	203
Total demand	177.5	176.5	171r	185
Internal paper sizing	54	52	49.5	52
Other pulp/paper	53	53	48.5	52
Municipal water/sewage	53	55.5r	57.5	65
Miscellaneous[1]	17.5	18r	15.5r	16.5
Exports	22	23	21	21
Imports	1.5	3	2.2r	3.5

1. Including pigment. r=revised.

ALUMINUM SULFATE

UNITED STATES

Uses: Aluminum sulfate is used by the pulp and paper industry for internal sizing, pitch control, and water treatment. Nonpaper applications include potable water and wastewater treatment.

Demand: Demand for alum by the pulp and paper industry rose between 5% to 6% in 1983, to an estimated 650,000 tons. Usage remained steady in 1981 and 1982 at the 615,000-ton level. Water and sewage treatment consumption was up slightly last year to about 462,000 tons, compared with 458,000 tons in each of the two previous years.

Sources: Of the 15 or so producers in the U.S., Allied Chemical, American Cyanamid, and Stauffer Chemical account for 75% to 80% of total capacity. Allied's third plant in Florida came onstream at the beginning of the fourth quarter in 1983, boosting its total capacity to over the 1-million-tpy mark.

Availability: There are no shortages on the immediate horizon since industry operating rates are still below 50%. 1984, market; 1983, market; 1982, market; 1981, market; 1980, market; 1979, market.

Pricing: The first increase for alum since July 1981 went into effect on Jan. 1 of this year and brought the liquid price to $145/ton (up 9%). Pricing history: 1983, $133/ton, bulk, liquid (17% Al_2O_3), f.o.b. works, freight equalized; 1982, $133/ton; 1981, $121-$131/ton; 1980, $101-$109/ton; 1979, $89-$94/ton.

Forecast: Alum consumption by the pulp and paper industry is not expected to increase this year to the same extent as in 1983. Similarly, total demand will probably remain in the 1.2- to 1.3-million-ton range for the foreseeable future. If material and freight costs continue to increase (the major reason for the price hike in January), there may be another boost by the end of 1984 or early in 1985.

CANADA

Uses: The pulp and paper industry uses alum for resin sizing, pitch control, process water treatment, and pH control. Other end uses for alum include municipal water treatment, sewage treatment, pigments, and synthetic crude production.

Demand: Pulp and paper industry alum usage is split about 50:50 between resin sizing and other uses and last year accounted for about 56% of total demand. In 1983, mill demand increased to an estimated 104,000 tons from the 98,000 tons used in 1982. Internal resin sizing consumed 52,000 tons in 1983 and 49,500 tons in 1982. Total demand also rose in 1983 to 185,000 tons vs 171,000 tons in 1982.

Sources: Five producers in Canada operate 14 plants. Alcan Smelters & Chemicals and Allied Canada's Allied Chemical Div. together account for 72% of total capacity. The next largest producer is C-I-L sulfur products west (formerly called Inland Chemicals), followed by United Chemicals and Borden Chemical.

Availability: Since last year's industry operating rate was only 68%, there should be no supply problems to the end of the decade. 1984, market; 1983, market; 1982, market; 1981, market; 1980, market; 1979, market to tight.

Pricing: Aluminum sulfate prices were hiked only once in 1983. Bulk liquid (17% Al_2O_3) rose about $8/ton to $139.71/ton on Apr. 1. At the start of 1984, lists rose 5% to $146.97/ton. Pricing history: 1983, $131.54-$139.71/ton, f.o.b. works; 1982, $131.54/ton; 1981, $100.70-$119.75/ton; 1980, $86-$100.70/ton; 1979, $79-$86/ton; 1978, $73/ton.

Forecast: Alum usage by the mills is slated to increase to 123,500 tons by 1987, an average annual growth of 4.5%. Of that amount, an estimated 63,000 tons will be employed for resin sizing. No further price boosts are expected in 1984.

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NOTE

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Cov. 1, p. 3, 5, 9, 13, 23.